On the Mines and Mineral Resources of Northern Afghanistan. By Capt. **Drummond,** *3rd Light Cavalry, communicated from the Political Department, Government of India.*

[Copper Mining district in the Ghilzie territory, South East of Cabool.]

From the valley of Dobundee, which communicates with the plain of Lagur in the direction of Koorrum, to the district of Moosge, about 14 miles south east of Cabool, and again from Moosge to Derbund and Rojan in the direction of Fezeen, is an elevated and rugged mountain tract highly metalliferous.

Geology of the District.—The formations of this mineral district are composed principally of Hornblende rock, and Hornblende Gneiss, Primary Limestone, and Mica Slate. The hornblende rocks are generally speaking of a fissile character, the limestones again are hard, compact, occasionally slaty, and from their feeble effervescence when tried with nitric acid, seem to contain a portion of magnesia, and may accordingly be referred to the dolomite species. The strike or direction of the strata, as may be oberved from the sequel, is nearly N. East and S. West, dipping at a considerable inclination to the N. West.

Conforming with the hornblende rocks of Dobundee is a calcareous sandstone formation with subordinate beds of slate clay enclosing their seams of coal. This sandstone is soft and friable, and must be distinguished again from another sandstone also calcareous, and of a still softer character. The latter formation is of very recent origin, and has taken place subsequent to the upheavement of the primary and metalliferous rocks, as may be well observed in the vicinity of Koh i Aeenuk, where it occurs in the form of sand-hill—the sandstone strata are horizontal, the primary again are all highly inclined, and sometimes even vertical.

What the upheaving rocks may be I am yet ignorant, but believe they will be found to be granitic, and if so, they must be of a much more modern geological era than similar rocks in England, from the position of the sandstone of Dobundee, which is evidently a tertiary deposit containing lignite coal. A section from the passes in the mountains of the Hindoo Kosh to the Indus would be extremely interesting in a scientific point of view, and convey no doubt an accurate idea of the structure of the country, but this however would form a separate branch of inquiry of itself, and is not of immediate importance to the present research, which has reference only to mining and metallurgy.

When I lately had occasion to bring the mineral resources of the Himalaya mountains before practical men and capitalists in London, the voluminous Geological Report of the able and intelligent officer, the late Captain Herbert, was never read by them. All that they cared about was that portion of it which related to the metalliferous minerals and means of working them; and what chiefly attracted their attention was, his account of the seven localities where copper was produced in the Provinces of Gurhwal and Kumaon.

In an economical point of view, therefore, the first thing to attend to in a district where metals are known to exist, is its probable productiveness ; and for this purpose a very close and minute examination of every rock, ravine, and valley is necessary to discover if metallic veins, or indications of veins abound. I have found these appearances in all the following localities :—

Views and indications of Copper, old Excavations, &c.—At Moosye in the pass of Shadkhanee in the limestone range, on the right bank of the Sagur river, and to the west of the village of Kuttasung, I found purple copper ore in very small quantity cropping out to the surface.

In the pass of Silawat to the east of Kuttasung, I found copper pyrites in greater quantity cropping out there. On the crest of the same pass, or rather a short distance from it to the eastward, indications of the metal appear in that quarter also, and seem to point either to grey copper, or to the vitreous sulphuret. The strike of the strata is about N. E. by E., and S. W. by W., dipping at an angle of 65° to the N. W. by N. Beyond this also, and still further to the Eastward, specimens containing purple copper ore in small quantity have been brought me lately from Kohi Chaghgye.

Again near the base of the same range, and within a short distance of the village of Kuttasung, are three old excavations, blocked up with stones and rubbish. Two of these I have been attempting to clear out lately with the intention of reporting on them hereafter. The ore is the purple variety, and I also found indications of the vitreous strike of the strata N. N. E. and S. S. W. dip 65° W. N. W.

On entering the Pass of Silawat, there is a ravine to the Westward, where a spring with a few trees may be discerned. About a couple of hundred yards above this spring is another old excavation, blocked up like the former, the declivity of the mountain is here very great; strike of the strata N. E. and S. W. dipping about 62° to the N. W. are copper pyrites, in a hard quartzose matrix, wall of the vein soft and slaty, and covered with the blue and green stains of copper. Here the limestone assumes a slaty structure and then verges into a micaceous rock, from which I conjecture that the ore at a greater depth will make (as the term in Cornwall is) to mica slate. The decayed and withered splinters of this slaty limestone, at first sight have much the appearance of clay slate—East of this again I found another excavation in a micaceous rock, evidently a continuation of the last mentioned, the direction of the strata the same, and dipping in the same quarter at a high angle, ore copper pyrites. In the same line I have traced this deposit to another locality a short distance off.

On the Eastern, or left hand side of the road going up the Silawat Pass, is another old excavation blocked up like the rest. Strike of the strata W. S. W. and dipping about 65° N. N. W.

I saw stains of copper here, but observed no further trace of the metal at the time I visited the spot; a specimen of vitreous ore has however been brought to me since, which is reported to be from that quarter. Higher up the hill, and on the same side of the road, is another excavation, where I found indications of vitreous ore. Strike of the strata about N. E. by E. and S. W. by W. dipping about 65° to the N. W. by N.

About a quarter of a mile to the Eastward of the last mentioned, there is a singular deposit. A vein or bed of iron ore, upwards of 30 feet in breadth, containing another vein of a mixture of iron and grey copper in a space about two feet wide. This mixture of copper and iron has been worked to the extent of a few feet, but the difficulty of separating the copper from so large a proportion of iron, was no doubt too difficult an operation for the ancient miners to be attended with profit, and must have been abandoned accordingly. Strike of the strata here N. E. and S. W. dip 75° N. W. From the direction of the strata, and the external character of this iron ore, it must I think be connected underneath with a great bed of iron ore nearly 40 feet in width, which I discovered in the Silawat Pass. The ore is massive, and is of a steel grey colour; sometimes it gives a blackish streak, and then it affects the magnet considerably, showing the presence of the protoxide. The great mass however gives a red streak, and below the surface will no doubt be found a well-defined bed of specular iron ore.

To the west of the crest of the Silawat Pass, and near the summit of the range, which I suppose must be about 1200 feet above the level of the plain of Moosye, are some extensive excavations. The general strike of the stratification here is about N. N. E. and S. S. W.—in some places it is nearly perpendicular, or dipping at a great angle to the W. N. W.; one of these excavations at first appeared to me like an open working, having the form of a perpendicular chasm in the mountain, the depth of which I measured upwards of 40 feet, and varying from 3½ to 8½ feet wide, at the deepest part the measurement was 7 feet and three quarters.

From further observation, however, I am inclined to suspect that this excavation, but especially others of a far deeper and more extensive character at Koh i Aeenuk and Seestungee, occupied originally the spaces of galleries, or levels, and that these have fallen in since, either from having been shaken by an earthquake, as the wreck and ruin presented by some of them would seem to indicate, or what appears probable, the action of water from the melting of snow at the surface, percolating by the walls or sides of the veins, has in process of time gradually loosened that portion of the ground which was left as a protection for the levels, and these levels having been driven along veins that preserve their course with the direction of the strata, which are nearly perpendicular, will account for the chasm-like appearance they now exhibit.

The system of mining which has been pursued here, differs materially from our improved modern methods. Instead of taking up a more convenient position for commencing operations lower down the brow of the mountain, and driving a gallery for a considerable distance, perhaps through barren ground, so as to reach the vein at a proper depth, and which opening is made at the same time to act as a drain, the plan adopted by the ancient miners seems to have been the making of a small entrance, about 3 feet wide, and 4 feet high upon the vein itself, and having gone down upon it at once in a sloping direction, until a certain depth was attained, they pursued a horizontal course, and stripped the roof of ore in their progress. This inattention to drainage has answered so long as the ore could be followed without the occurrence of water, but I suspect even then in some places, they must have felt inconvenience from the water caused by the melting of the snow in spring. I do not believe from the appearance of the galleries which are still remaining, that timber was much used, if employed at all for supporting them. The structure of the rocks in most places being of a compact character, and the great dryness that prevailed, may have enabled the miners to work to a considerable extent without that aid. In excavating the ore and opening ground, these people seem to have used a sharp-pointed well-tempered instrument, as may be observed by the marks of their work on the walls of the galleries, particularly at the mine of Seestungee.

As the most important point to ascertain is the appearance of the deposits of ore at a considerable depth, the width of the veins, &c. I have been particularly desirous of penetrating so far under ground as to arrive at the different spots where the ancient miners left off working. In some instances I got so far, that I believed I should soon accomplish that object, but I have invariably had my progress arrested by large masses of rock, stones, and rubbish which have fallen in. A native of Moosye lately brought me intelligence of some deep excavations which have been discovered on the eastern side of the Silawat Pass. Upon asking him why he had not taken a light to examine the interior, and see if they were more perfect than those I had already discovered, he gave me to understand, that like the rest of his countrymen, he had superstitious misgivings in regard to the exploring of those old and abandoned excavations, and was further deterred by observing the skin of a snake at the entrance of one of the galleries. The dread of meeting reptiles of this kind in these deserted mines, is one of the reasons why the people are so ignorant about them. The same individual told me, that often as he had hunted over those mountains from his earliest youth, he had not the least idea that the excavations were so numerous, only a few had been observed, or were known to the neighbourhood until I commenced my researches.

On crossing from the Moosye range to the mountains of Baghgye, I obtained some rich specimens of vitreous and purple copper ore in different places, and also copper pyrites, but did not observe any regular vein, except one of copper pyrites in hornblende gneiss, which is about 10 inches wide; this is very poor at the surface, but may however at some depth turn out rich. At Kotil i Dushtuk, I picked up a good number of stones containing copper pyrites in a hornblende gneiss formation, running N. E. and S. W. and dipping about 55° N. W.

This rock is very dark in some places from the prevalence of the hornblende, in others it has a yellow weathered appearance, and so much disintegrated, that I had not an opportunity of examining the locality well; there are quantities of rock, green-stained from copper. In one place where it was more compact, I obtained specimens from some strings or small veins of copper pyrites, in a quartz matrix, evidently connected with a larger vein, and from the abundant indications at the surface, I suspect that a considerable deposit must exist underneath. From Dundhanee in the direction of Jowhar to the south of Rotil i Dushtuk, specimens of green-stained rock have been brought me lately, and said to be in still greater abundance.

To the south of the Baghgye range is the great mine of Koh i Aeenuk, which I have already mentioned, all in a state of ruin and dilapidation. Purple copper ore crops out to the surface; and the excavations, as well as a quantity of slag and vestiges of ancient houses that remain, show what a productive mine this must have been in former days. The dreary and desolate aspect of the spot, with a solitary hut and a few squalid inmates, afford a melancholy contrast to the throng of industry which must have been witnessed here in better and more prosperous times. About a mile West of

Aeenuk is the mine of Seestungee, which I have also mentioned, and which is in a similar condition with the former. In this mine there is a chamber, one side of which is covered with sulphate of copper; the chamber is about 18 feet in length, 12 in breadth, and 10 in height,—and the end of it is blocked up with stones and rubbish. Some of the excavations here are so large, that they have more the appearance of caverns than mining galleries. A short distance from this, on the road to Koh i Aeenuk, I observed near the summit of a limestone rock several veins of spar carrying copper ore, principally copper pyrites; one of these is about 11 inches wide; between this again and Aeenuk, there is another spot where the green-stained indications of copper appear abundantly, showing, that the metal exists there likewise.

East of Aeenuk, in the mountains of Acoorookhail, I found a vein of solid copper pyrites about an inch thick in hornblende gneiss; at Essurtungee on each side of the torrent, I observed copper ore in many places, though I was not fortunate enough in finding a regular vein, whole cliffs of the rocks however are covered with the indications of copper. The richest specimens of red oxide of copper and native copper in my possession, were brought to me by a native, and said to be from the hills of Goorgee Mydan, not far from Acoorookhail. Of the locality, however, from whence they were procured I am doubtful, as the native alluded to was indebted to another for the specimens. I opened the ground in one place to the extent of several feet, and though a few indications of the metal appeared, many circumstances rendered it evident, that they had not been procured from that exact spot, and that a further search was necessary.

At Derbund, in Tungee Khooshk, in a gneiss and mica slate formation, I observed abundant green stains of copper. At Kila Ataye, there are several veins of quartzose spar carrying purple ore, one of which I measured about a foot in breadth, the rock is mica slate, and contiguous to limestone. In Cornwall the richest deposits I was told generally occur at the junction of the clay slate with the granite; and in this mineral tract, I believe the most productive will be found at the point of contact of the limestones with other rocks.

At Tezeen, I discovered small veins or strings of rich ore ramifying in different directions, and forming a kind of net-work in a limestone rock. I saw no decided course of ore of any bulk, but what there is of it, is very rich, being composed of the vitreous and red oxide varieties, and native copper. The chief of Tezeen, I am told, found a mass of the latter close by his house on one occasion, and so large, that a copper vessel was manufactured from it. This must have been brought down by the mountain stream, and most probably from the quarter I have mentioned.

In a ravine at Khoondurra, between Seestungee and Dobundee, I obtained some specimens of copper ore in small quantity, but did not discover any vein, though a closer search may yet succeed from the indications of the metal in that quarter.

At Dobundee, on entering the valley, I found at Shinkye, on the right bank of the rivulet, specimens of red oxide and grey copper, but discovered no regular vein at the time. In a ravine named Lahazour, about half a mile from Shinkye, I observed in a hornblende formation an outcrop of grey, vitreous, and red oxide of copper accompanying a vein of spar principally calcareous. Beyond this in another ravine named Zerazour, there is a thin vein of rich copper ore similar to the preceding—formation still hornblende; the strike of the stratification in this direction, is nearly N. E. and S. W. dipping about 65° to the N. W.

In the ravine of Chinarkhail, I found a vein* of copper pyrites cropping out in small quantity, and higher up at Chenar, less than a quarter of a mile from thence, I found a vein of grey copper, about 7 inches wide, with a considerable proportion of iron; this vein bends a good deal in consequence of the twisting of the strata, the general direction of which is about N. E. and S. W. dipping upwards of 60° to the N. W. The formations here are all hornblende.

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* When I use the term of *vein* it is to convey my meaning in more familiar language, at the same time the Cornish phrase *lode, which signifies* a course of ore, would, properly speaking, be more correct. All the lodes in this country are what would technically be termed beds of ore conforming with the strata, and not veins, which are rents or fissures traversing the strata, and filled up with mineral substances.

In the ravine of Jerobaee there is a ferruginous looking vein, containing vitreous ore, and also grey copper, the latter has a large proportion of iron, and is found about 5 or 6 yards apart from the former. On the opposite side of the ravine I found indications of the metal also, and beyond this in the same line, I found similar indications in a small ravine adjoining, and believe these to be all one and the same deposit connected underneath. The strike of the strata here is N. E. and S. W., all highly inclined. About 300 yards to the N. W. of these localities is another out-crop of copper ore, with a good deal of the same ferruginous appearance; this seems to bend towards the others, running nearly East and West, but is a distinct deposit in my opinion, and unconnected with them; these veins are all found in hornblende.

During my survey of Dobundee, I observed several rolled masses of a dark coloured iron ore brought down by the river. This ore yielded a blackish streak, and affected the magnet, but did not attract iron filings. What I observed was evidently derived from the surface of a bed of iron ore. In the Chenar ravine, about a couple of hundred yards from the vein of grey copper, which I have described, I obtained a few fragments of magnetic iron ore which powerfully attracted the filings, but saw no trace of a regular deposit in that quarter. These facts, however, render it not improbable that a bed of magnetic iron ore may exist in the neighbourhood; having not yet completed my examination of that part of the district, I regret I cannot speak decidedly on this subject.

Extent of the District, &c.—With regard to the extent of this mineral tract, Tezeen is the furthest point to the Eastward, where I have found copper ore, and specimens of copper pyrites have been brought me from Wurduk to the Westward. Specimens of purple ore have been sent me from Spega to the South, and I have traced the metal as far North as the hills about Cabool.

The most promising veins I have discovered are those of Derbund and Dobundee,—of the old mines, Koh i Aeenuk holds out the best prospects. I have reason to believe that more veins equally, if not more favorable, may yet be found, when every rock is sufficiently investigated. A perfect examination of this kind, is of great importance, for the two-fold object of showing the external signs of the productiveness of the strata, and guiding the miner at once to the most desirable points for experimental operations. From the number of natives I have been employing to search for me throughout the district, and who well understand now what is wanted, I feel confident that if this plan were continued for a short time longer, not a spot would remain unexplored. Specimens have been lately brought me from new veins in Derbund, as well as from Rojan, and Sungdurra on the southern side of Koh i Kubeer, the most elevated of the mountains in that quarter of the country.

In my former Report, I mentioned that I had discovered the richer varieties of copper ore, namely the purple and vitreous sulphurets, the former containing 60 per cent of metal, and the latter about 80—I have now the satisfaction of adding to these the red oxide containing 90 per cent, and native copper. As far as the character of the ore is concerned then, it is of the first quality. Of course what I allude to is the pure mineral unadulterated by the matrix. What the ore in mass will produce should the mines be opened, can only be determined when that takes place; but it will I think, yield about the same as the Chilian, namely, between 20 and 30 per cent. The average of the ore of Cornwall is between 8 and 9 per cent, and, as I stated in the Report alluded to, it is this difference in the quality of the ore, that enables the Copiapo Mining Company to dispose of their ore in England at a profit, notwithstanding the vast distance of transport. The ore is brought down on the backs of mules from the heights of the Cordilleras to the seaport for £3 per ton, shipped from thence to Swansea in Wales for £5 per ton, when it is finally smelted, and the produce exported abundantly (no doubt to India) as English copper.

Mineral Prospects of the District.—In respect to the capabilities of this mineral district no one can take upon himself to form an estimate of what is underneath the surface, until practical trials are made, but, if we base our calculations on the most reasonable probabilities, there is every expectation that these trials will prove eminently successful.

By the foregoing details it is apparent, in the first place, from the number of veins and indications of them which have been discovered, that the whole of the strata are highly metalliferous.

Secondly, the quality of the ore is excellent, and the richest varieties are to be found.

Thirdly, it is evident, from the extent of the excavations of Koh i Aeenuk, Seestungee, and Moosye, as well as the quantity of slag still remaining at the former place, that the people who worked these mines, must, in following the ore to a considerable depth, have found it increasing, or at any rate not diminishing in quantity.

Lastly, we may reasonably infer, that these people, by confining their operations to so few localities, found the work sufficiently plentiful and lucrative to give them employment, without being under the necessity of opening new ground, and this will account for so much being left untouched. The mines also must have been abandoned in consequence of some political convulsion or foreign invasion.

Facilities for working the Mines.

Means of Drainage.

Of the means of drainage, I may say, that in general there is no want of declivity of ground for obtaining adits—the term *adit* is a technical one in mining, used to denote a gallery or passage which acts at the same time as a drain. In an economical point of view, this is of great importance, as the system of working by a succession of galleries above the adit-level in some mines, or having to go but a short distance under it in others, is attended with much less outlay than when the reverse is the case, and mechanical power must be had recourse to, for raising the water from a considerable depth to the drain. In the Gwennap mines in Cornwall, for instance, where the deepest shaft is about 1700 feet below the surface, there are no less than seventeen steam engines, some of which are of enormous size, and these, with a water wheel 42 feet in diameter, are employed night and day in pumping the water, and raising ore and rubbish from the mines. In the Moosye ridge, the principal mines are situated about the summit of the mountain; at Koh i Aeenuk again, which is but a small hill in comparison, there appears to be abundance of room for bringing in an adit under all the old workings, but at Seestungee, this would not be managed so easily. The whole of this metalliferous tract, however, is so much more elevated and mountainous than the mineral ground of Cornwall, that the unwatering of the mines could be effected with greater facility, and at much less expence.

Falls of water for machinery, &c.

Small streams for washing, cleaning the ore, &c. are often wanting in these mountains, but this defect may be remedied wherever springs may be observable, by piercing the slopes with *karezes*, and obtaining the necessary quantity of water. At Derbund, there is a small stream which passes close by the veins of purple ore I have described. The river of Sogur pursues its course along the base of the range at Moosye, where the mines are situated; the rivulets of Dobundee, Tezeen, Chuckeree, &c. at all seasons of the year have a sufficient supply for moving machinery, whilst mountain torrents, such as those of Esourtungee and Jerobaee, possess I think sufficient water, considering the greatness of their fall, for turning stamping mills, and crushing apparatus of that description.

Supply of Timber.

The pine forests which stretch from the Sufued Koh to the Southward, will afford a permanent supply of wood for timbering the mines, and charcoal for the smelting furnaces. The same carriage which would convey the ore to the fuel, would bring back timber for the mines. The furnaces best adapted for this country, are not the reverberatory ones of Swansea, where coal is the fuel, but the blast furnaces of Sweden, where charcoal is employed. It will be a matter for future consideration, whether the most desirable site for these would be in the direction of Spega and Hazardurukht, or of Tezeen. The former will have the advantage of being better situated for labourers, whilst the latter, by being near the Cabool river, will have the convenience of raft carriage to the Indus.

State of roads and means of transport.

Mining operations may be commenced in this country without incurring much expence in road-making at the outset. At present the roads are only tracks, but they answer camels, and the mountains afford pasture for the maintenance of these useful animals. Mules, ponies, &c. are also used for carriage, and the neighbouring district of Koorrum is famous for its breed of the former. Roads for wheeled carriage may in process of time be made, as improvement advances, and this will create a great saving in transport throughout the country generally. An excellent one might be cut from Cabool to Dobundee, by the plain of Sogur, and no doubt the same could be continued to the banks of the Indus by the valley of Koorrum; guns at any rate have already been taken by that route. As soon as this road is surveyed and repaired, and political obstacles are removed, the circuitous route by the Khyber Pass will be forsaken for this shorter and safer line of communication with Hindoostan; meanwhile as far as the mines are concerned, the most economical method would be to purchase a certain number of camels, the transport management could then be conducted at a moderate expence, and occasion very little trouble.

Habits and character of the people.

The occupations of these mountain tribes are partly agricultural, but chiefly pastoral and commercial. Those who have flocks of sheep migrate from place to place according to the season of the year, whilst those who have camels, engage in trading speculations, and in hiring out their camels for transporting wood, charcoal, &c. to Cabool, salt from Kalabagh and Malgeen, iron from Bajour and Foormool, and merchandise to and from Peshawur, and various other quarters.

I regret to add, there is another class that I call the predatory, which the poverty of the people, the distracted state of the country, insecurity of property, &c. appear to have brought into existence, and gangs of these banditti have been infesting the country to the no small detriment of the industrious merchant. The different tribes which contain this class within them, are the following :—

Adrumzyes	Rob by night.
Muminozyes	Ditto ditto.
Ahmedzyes of Spega	Highwaymen by day.
Kurrookhails	Ditto by day and night.
Khivazuks	Rob by night principally.
Ooreakhails	Ditto ditto.
Ootkhails.	Thieves by day principally.

These molest the country between Ghuznee and Jelallabad—some rob chiefly by night, break into houses, annoy an encampment, &c. others steal in broad daylight, in the bazar of Cabool even, and are famous for their dexterity in pilfering; whilst others again come down from the mountains in force, attack a cafila, and return immediately with the property they have captured.

It need not be supposed, however, that because a portion of the people have hitherto been leading this lawless life, that the hope of establishing useful works, even in the secret haunts of these robbers, is by any means impracticable. It must be remembered, likewise, that a revolution has taken place in the country, and that during the last year, the constant political excitement which was kept up, of itself produced much of this evil. Formidable as the state of affairs may seem, the difficulty of uprooting the evil is much more in appearance than in reality. There is indeed a regular system of robbery carried on, which must be systematically dealt with, to be effectually put down. This I believe may be accomplished without levelling a single fort, ravaging an acre of ground, or spilling one drop of blood. The Ghilzyes of that district, are about the finest race of people I have seen in Afghanistan, and the predatory portion, though wild, are far from being intractable. But they have been long living without the pale of the laws, in a country distracted and torn with feuds and dissensions, without any security of property; the strong ever oppressing the weak, and have in a great measure been brought by circumstances into this lawless mode of life. Give them, however, but constant employment, with good wages and regular payment; encourage a spirit of industry, both by precept and example; let strict justice be dealt out to them without respect of persons; and we shall shortly see their swords changed into ploughshares, industry take place of licentiousness, and these people be converted into peaceable and useful subjects. A firm, but just and liberal hand, in my opinion, might mould them into any thing.

During the late disturbances, it was often remarked to me, what a detestable race these Afghans were; that a man could not stir a few yards from his house or his tent, without the risk of assassination; and that three times the amount of military force was scarcely sufficient to keep this unruly country in order; and yet, I have gone with but a few followers into the midst of them, have wandered amongst the wildest and most desperate characters, often without a sword at my side or a pistol in my belt; and even during the very crisis alluded to, when I returned to Cabool, I did so entirely in opposition to my own views and inclination, and only in accordance with an express order to that effect.

Since I commenced this research, I have made a point of living with the people, and I am of opinion, that in any attempt to develop the resources of a country, an acquaintance with the character of the inhabitants is a matter of serious consideration. The result of my observations are these: that if we take advantage of the keen commercial spirit of this nation, and direct its energies into the many useful channels which may be opened to them; if the conciliatory policy be steadily persisted in, all gloomy suspicions as to our future intentions removed, and the Afghans become persuaded that we are really their friends;—there is no quarter of the east where British influence will more rapidly take root, and British power be more readily consolidated—whether the nature of the climate, the wide field for European improvement, or the freedom from prejudice on the part of the people be considered.

Rate of payment for labour, &c.

It is not easy to say exactly, what the rate of payment for labour would be in those mountains, when order is completely restored, and a new state of things brought about; but there can be no doubt of this, that it will be moderate.*

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* Osman Khan, who is a considerable landed proprietor himself, and experienced, is of opinion that only one-third of the available land of Afghanistan is under cultivation.

Osman Khan informs me, that during Dost Mahomed's time, he used to hire able-bodied labourers for cutting canals, and reclaiming waste land at Balabagh, at the rate of two annas per day; but that now he hires them for about three annas. The rate which at present exists in Cabool is a forced one, the result of a combination of circumstances, which can only last for a limited period until things find their proper level.

The Jajee tribe, and other industrious mountaineers, are all robust and stout-looking people, and during the winter travel as far as Peshawur for employment, which they would not be induced to do if work were afforded them at home. There are few points in the country more favorably situated for a command of good workmen than the mining district under discussion.

As the price of labour, however, is directly affected by the price of food, it will be a matter of great importance for the successful working of the mines, that the arable land in their vicinity be properly attended to. If the mountains bear witness to an extent of industry unknown to their present ill-fated occupants, the state of agricultural affairs in the adjoining fertile plain of Mogur, bears equal evidence of a former state of great prosperity, and points, in a significant manner, to the withering effects of Afghan misrule. The remains of ancient canals and water courses, the quantity of available land now lying waste, or in a low state of cultivation, the wretched condition of the people, and their inability to procure the necessary means of cultivating the soil, all show how much might be done by the application of capital, as well to the labours of the field, as to the dormant mineral resources of the country.

In conclusion, the following facts I would submit, may be considered as fully established, viz.:

Decided indications of abundance of copper, and of the richest varieties of ore. Wood in abundance, for timbering the mines, and for charcoal.

Water as a moving power for impelling machinery, thus obviating the expence of steam, camels, mules, &c. for carriage.

A hardy and able-bodied population on the spot, anxious to be employed as workmen.

Here therefore are the means for the production of this metal, and apparently to any required extent. It now only remains, that the inquiries I have had the honour of commencing, should be followed up; arrangements made for the suppression of the prepatory system; the providing an adequate capital for working the mines on scientific principles; and adopting such measures as will facilitate the transit of metallic produce to water carriage on the one hand, and the different marts in the interior on the other.

Iron of Northern Afghanistan.

As no mining operations can be carried on without a command of well-fabricated iron, the state of the manufacture of this indispensable metal becomes a primary consideration, in any attempt to render the mineral resources of an uncivilized country available; and certainly if any thing be required to show the abject state of the arts in this quarter of the globe, the iron trade and manufacture may be quoted as an instance.

The iron of Bajour, which is produced from magnetic iron sand, is not only in use throughout the northern districts of Afghanistan; but from its superior quality, is likewise in great demand in the Punjaub. It sells in Cashmeer, for three times the price of the common iron of that country, and it is used in Candahar for the fabrication of matchlocks.

Were an improvement in the manufacture to take place, iron might no doubt be obtained equal to the Swedish—the best description in Europe. It was my intention to visit the district of Bajour at this time; but having been prevented from accomplishing my object, I am dependent on what information I have picked up hastily from merchants and others, who have been in the habit of visiting it, for the purpose of purchasing iron. The supply of iron, however, which the mountains in that direction afford, must be perfectly inexhaustible, from the intelligence I have derived, as to the immense quantity of this iron sand, which is annually washed down from their deposits.*

A sample of the sand was brought to me sometime ago, and taken from the bed of the stream at once, without being sifted and prepared for smelting. On applying the magnet, the ore was immediately taken up, and the quartzose and other strong particles remained. I then placed a small quantity of iron filings in contact with the ore, and the mutual attraction of the filings with the crystals of ore, was easily recognized with the assistance of the magnifier. It is described as occurring in great abundance in the mountain streams of Deer, Belour, and Mydan, which fall into the river of Punjcora, that ultimately joins the Cabool river below Peshawur.

The methods of reduction in this country, appear to be the same with those employed in different parts of India; and the manufacture in the Himalaya mountains, already described by Capt. HERBERT, is equally applicable to that of Bajour. It is evident, that whatever quantity of the ore is submitted for reduction, a small proportional part of the iron contained in the ore is brought to the state of useful iron. In the first process, a very crude mass of iron and scoria is produced; this crude mass is then submitted to the fire by a blacksmith, and after an incredible sacrifice of labour, a piece of malleable iron, fit for ordinary purposes, is at last produced, which, as may well be supposed, is any thing but the purest.

A more rude and inefficient system of smelting could not be devised, nor must it be understood from the simplicity of the management, that the processes are economical—they are the most expensive which could possibly be employed. It would be absurd to suppose that a refractory metal like iron, can ever be properly or economically fabricated by means of a great expenditure of manual labour, to the neglect of a mechanical power, such as a plentiful stream of water can afford, and which is to be obtained abundantly in the district that yields the sand I have described. So long as the miserable air bags, and a common blacksmith's sledge hammer are used for that purpose, iron inferior in quality, very deficient in quantity, and at an extravagant price, must be the necessary consequence.

But Afghan inexperience and mismanagement does not stop here. The crude iron is not converted into malleable on the spot, where charcoal abounds and labour is exceedingly cheap; but is transported slag and all, to Cabool, for instance, where both charcoal and labour are exceedingly dear. Again, in working up this crude iron into malleable, one-third is lost, so that the unfortunate purchaser has not only to pay for an expensive and ill-manufactured article in the first place, and for the difference in the price of labour and charcoal, pointed out in the second, but for the carriage of a large proportion of dross.*

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* Should there be a proportion of titanum combined with this ore, I imagine it will be trifling. When I submit a supplementary Report, with the chemical analysis of different ores, this will be explained. The colour of the iron sand is dark black.

The cost of the transport of a *khurwar* of iron, (13 Hindoostanee maunds,) in Dost Mahomed's time, was about Rs. 15 from the Punjcor ariver to Kooner, and from thence to Cabool Rs. 10, making in all Rs. 25. At present, the hire will I am told, be about Rs. 35; but for the sake of example, let Rs. 30 be looked upon as the expence of conveying a *khurwar* of iron from the Punjcora river to Cabool. A hundred *khurwars* of this iron are said to be about the quantity annually consumed in Cabool, in the time of Dost Mahomed; lately the demand has greatly increased. Taking this quantity only, however, as the estimate, we have at the rate of Rs. 30 per *khurwar*, an expence of Rs. 3000 for carriage; but to render the iron fit for use, one-third is lost, so that an expence of Rs. 1,000 is every year incurred in Cabool, for the conveyance of slag. The information I have been able to gather respecting the probable quantity annually produced in Bajour is so vague and contradictory, that I do not feel justified in carrying out this calculation farther. At a guess, I believe it must be about a thousand *khurwars;* but be this as it may, there is no doubt that the saving, effected by a well manufactured article in the mere transport alone, would in a short time cover the expence of erecting an iron work upon the Swedish principle.

As a set-off to the practical difficulties inseparable from establishing works of this kind in a new and uncivilized country, the advantages which the manufacture of Bajour would possess over that of Sweden, would be these:—

First. The difference in the price of labour, the wages of a workman being about 2 annas per day, according to the present rate; whilst labour in Sweden, though moderate, varies from 6*d*. to 1*s*. per day. Allowing, however, that the price of labour should rise in Bajour, and that able-bodied workmen received from to 2 to 4 annas per day, still the rate would be considerably less than the Swedish.

Secondly. The circumstance of mining being commuted for the easy process of collecting and washing the sand, would occasion a great saving of expence; women and children are employed in this operation.†

Thirdly. The forests are described as being of great extent, and close by the localities where the iron sand is collected, and the charcoal used, is made from oak (quercus beloot,) which is the best adapted for that purpose. This will give the manufacture of Bajour a decided superiority over that of Sweden, where the light charcoal of the pine only is used, oak and hard wood being scarce in that country—the charcoal moreover is transported in sledges during the winter, a distance frequently of 30 miles to the furnaces.

I shall here offer a few observations on the subject of the iron in Northern India, for the purpose of showing, that if an improvement be called for there, the argument applies with still greater force to the remoter regions in this quarter.

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* The iron is sold in the shape of bricks of different sizes. In making a trial the other day of one of these, which weighed one seer of Cabool, (equal to six seers of Hindoostan,) I obtained out of 16 parts, 10 of iron fit for use.

† The iron sand is brought down annually by the melting of the snow in spring, and in such vast quantity, that for one iron work at any rate, the supply is ample without having recourse to mining.

It is commonly imagined in India, that because English iron is brought out as ballast, and landed on the coast for little more than the price it costs in England, that an improvement in the native manufacture would therefore be attended with difficulty. But however much this may apply to the coast, the case is altered when English iron is transported into the interior. It then becomes enhanced in price, and from this cause, as well as the inferior materials of which it is composed, the demand is limited, whilst the native manufacture continues active under all the disadvantages of the most wretched system of smelting, and which, as I have already remarked, is in fact, the most expensive that could be employed.*

All the iron of England, (with the exception of what is produced at Ulverstone in Lancashire,) is made from clay iron stone, which yields about 30 per cent. of metal, and the fuel used being coal, the sulphur combined with the latter deteriorates the iron, and soft or malleable iron cannot be produced equal to the article that is afforded by richer ores, and charcoal smelting. In the Northern Provinces of Hindoostan we have the richest iron-ores, namely, the magnetic, and also the different varieties of the red oxide, such as the specular, red hematite, &c. and these will yield from 50 to 65, or perhaps 70 per cent. of metal, which is all in favour of the saving of fuel and general economy.†

At Ulverstone in Lancashire, iron is manufactured from red hematite ore, yielding sometimes 50, and sometimes 60 per cent. of metal; the fuel is oak charcoal, and a superior iron is produced, which is of great tenacity, and much used for drawing into wire; steel also is made from it for secondary purposes.

During my inspection of these works some years ago, I was closely questioned by one of the iron masters as to the prospects of establishing an iron work in the Himalaya mountains: for example, I was asked about the nature of the ore, and if a sufficient supply of charcoal was to be had, if water as a moving power was abundant, labour cheap, and if water carriage was procurable, &c. &c. To which I replied, that amongst different varieties of rich ore, the red hematite, the same he had at his works, existed also in that quarter; that charcoal was to be had on the spot, for the price only of cutting the wood and preparing it, as the forests were interminable; that labour was about 3*d.* or 4*d.* a day; streams capable of turning any machinery abounded, and water carriage was within a tangible distance of the base of the mountains; that the disadvantages at present, were owing to the want of proper commercial roads from the mines to the plains, which nevertheless might be made by following the course of the principal rivers, as indeed had been done partially in one case, for the sake of pilgrims. I then rallied him about the anxiety he seemed to evince in the matter, and asked him if he was afraid of my running in opposition to him so far off as India, and moreover 1,000 miles in the interior; to which he replied, "Why to tell you the truth, we send out a quantity of iron to India."

Now whether the iron of Ulverstone be used in Calcutta for the manufacture of suspension bridges, I am not at this moment aware; but when I left Kumaon two years ago, thirteen of these bridges* had been erected, in a province abounding with iron mines, and inexhaustible forests, and with reference to which, a celebrated mining engineer, in corresponding with me upon the subject, makes the following remark: "It strikes me, that if an iron work is begun in the Himalayas, iron can be afforded to India at a rate lower than the present to a great degree, and at the same time afford a large profit per ton."

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* According to Mr. McCulloch, three-tenths of British iron are used as cast iron, and principally consumed in the United Kingdom, the other seven-tenths are converted into wrought iron.

† Some of these iron mines are situated near the plains, some are higher up, and the copper mines higher up still. The principal iron mine is at Khetsari, in the broad and fertile valley of the Ramgunga.

In the district of Bajour, an iron work upon the small scale, and similar to the Swedish, might be erected with every reasonable prospect of advantage. When water power can be procured, and a steady supply certain, the saving will be great,† as compared with the application of steam power; a substantial wheel can be erected at a small expence, for working blowing apparatus capable of giving blast to two furnaces; commencing in the first place with one, in order to learn by experiment the suitable charges of iron ore, charcoal, and limestone; and to find that very little iron is mixed with the scoria, which comes off constantly from the iron at the bottom of the furnace.

Should an improvement of this kind take place in the Bajour manufacture, iron of a much better quality, in much greater quantity, and at a reduced expence, might be afforded to the whole of those countries situated between Ghuznee and Lahore; from the excellence of the materials, no foreign iron can ever compete with it, and superior steel may also be obtained from it. No iron manufactured with coal can ever be converted into steel, owing to the presence of sulphur in the coal. It is in consequence of this, that the great mass of steel in England is made from Swedish iron, and the cast steel for the superior cutlery of Sheffield, is from the iron of the mines of Dannemora, the ore of which, (massive magnetic,) differs from all the others in Sweden, on account of its purity; and the iron sells on that account for about double the price of common Swedish iron. The other ores of that country are, I understand, principally magnetic; but more or less contaminated with sulphur, and had they not the advantage of charcoal smelting, the iron they produced would not sell at the high price which is obtained for it.

The prices of crude iron in Cabool in time of Dost Mahomed Khan, and since then, have been the following:—

	In Dost Mahomed's time. Cabool Rupees.	Latterly. Cabool Rupees.
Bajour iron per md..‡	8	12
Foormool ditto ditto,	6	9

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* The transport of the last of these bridges, which was put up at Jula Ghaut on the Kali Gogra river, amounted to Rs. 80 per ton. This reminds me of a story that is told in the neighbourhood of Loch Earn, in Perthshire. In a small glen on the Northern side of the lake, a building was erected about a century ago, when there were no good carriage roads in that part of the world, as is the case at present. The lime used on the occasion, was brought on the backs of horses from a considerable distance in Fifeshire, and it was left for the succeeding generation to discover that an excellent bed of limestone existed in the same glen; but this was not all, for the house itself was built of limestone.

† Perhaps the finest example that could be quoted of the effect of water power in saving manual labour, is at Turton near Bolton, where there is an iron wheel at a cotton mill, upon the spider arm construction, overshot, sixty feet in diameter, and ten feet broad in the awes or buckets. From this wheel, the power is taken for moving all the spinning machinery within the mill, which is reckoned equal to 50,000 cotton spindles, or the work of 50,000 people.

‡ The maund of Cabool is equal to 8 seers of Cabool. The seer of Cabool, is equal to 6 seers of Hindoostan.

The iron of Foormool is from the country of the Wuzeereas, in the direction of Kaneegcorrum. It was my intention to have visited this district after surveying Bajour, for though the iron is much inferior to that of Bajour, it is very abundant, and extensively used for implements of husbandry, horse-shoes, cannon balls, &c. The specimens of ore which have been brought to me, and reported to be from that quarter, are clay iron stone, and I believe this to be ore, from the fact of coal existing in that vicinity.

Should a foundry for cast iron be eventually required in Afghanistan, the iron in the Wuzeeree country will be well adapted for the casting of shot, shells, engine cylinders, pumps, &c.; whilst for bars, rods, fire-arms, &c. the superior iron of Bajour will always be preferred.*

I have mentioned the existence of iron ore in the copper district which has been described. The Moosye iron is not conveniently situated for fuel to render it of immediate importance. A specimen, however, of iron ore has been brought to me from Huryoob in the Jajee country, which borders on that district. The ore is of an iron-grey colour, and gives a red streak, but does not affect the magnet. It is reported to be in great quantity, and the country is described as being covered with jungle. Should the copper mines in the course of time be worked on a great scale, and the consumption of iron proportionate, mines of the latter metal will also be worked there, for the sake of the demand in that neighbourhood, and of Cabool.

In concluding these imperfect notices on the subject of the copper and iron deposits of this country, I would beg to observe, that in directing attention to the former metal, I do so, not only on account of the demand of it for coinage, and the ready market it meets with from its extensive use for domestic purposes throughout the countries to the west of the Indus, but from the known demand for it to the east of that river likewise.

Should gold or silver mines be discovered in these regions, and there is nothing unlikely in the idea that they may, the probability is, that they will always, as far as intrinsic value is concerned, occupy a very inferior scale of importance to the copper repositories.

If it be a common saying in South America, (the richest country in the world for the precious metals,) that "a copper mine is a fortune, a silver mine scarcely pays itself, but a gold mine is ruin," we may readily conclude, that in this quarter of Asia, where there is such an extensive consumption of the former, the observation is still more likely to become applicable.

But valuable as these repositories of copper may prove, they again need not be expected to equal the results which may be anticipated eventually from working the great stores of iron to be met with in Afghanistan.

By rendering the copper available, however, for which there is such a great market, a fresh demand is provided for the iron, and an improvement in the manufacture of the latter will not only directly aid the working of all metallic veins which may be found, but become the basis of various superstructures, and when its more general use is inducedby a deduction in price, civilization and improvement will rapidly extend.

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* There is another iron produced in another locality in the Wuzeeree country, from which steel is made. The ore I have not yet seen, but it must be from a different formation to the one which contains the clay iron stone. I shall adverted to this in my supplementary report.

It is commonly supposed in this, as in other barbarous countries, that Russia must be rich, since gold mines are reported to be there. But the gold, the platina, and other metallic produce of the Urals, are well known to be far inferior in financial importance to the iron, and if in the Uralian chain, the activity and enterprise of the Muscovite can fabricate annually the large quantity of 7,400,000 pood, (132,000 tons) of iron, what may not British energy and industry effect, when they come to be applied to the vast deposits of iron, and the deep and endless forests of the Indian Caucasus and Himalaya.*

Remarks on other Mineral Productions of Northern Afghanistan.

I proceed now to offer a few observations on the other mineral productions of this country, and I may here mention, that the plan I have been pursuing hitherto, has been to employ the natives themselves to search in all directions, and bring me every kind of mineral which has the appearance of an ore. The exciting a spirit of inquiry in this way, although it has been expensive to myself, is by far the most expeditious method of enabling one to arrive ultimately at a general knowledge of what the country may possess. During the previous year, the political ferment that existed thwarted my success very much ; but now that these troubles have ceased, and the attention of the people is withdrawn from them, the fruits of this plan, if followed up, will become much more apparent. Nothing can exceed the avidity withw hich the Afghans enter upon what to them is so novel a pursuit ; and the laborious, and ardent manner in which they traverse the most rugged rocks, and most unfrequented places, when stimulated by an appeal to their interests. It is my rule to pay them well, when I have any thing like proof that they have worked hard, even though they have been unsuccessful ; and, on the other hand, if successful, they are sure of a handsome reward.

Of the valuable mineral coal, there are three directions in which lignite coal is found in the northern districts of Afghanistan.

Coal.

The first formation is along the line of the Indus, the most promising locality of which appears to be near Kaneegoorum in the Wuzeeree territory.

Parallel to this, is a second outcrop of coal in the Ghilzye territory, which I discovered lately at Dobundee, and whilst I have been writing this paper, specimens have been brought me from Hissaruk.

The third formation is in the Huzarah country ; specimens of this have been brought me from the vicinity of Syghan.

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* According to a pamphlet published in 1825, by Mr. H. J. Prescott, for the removal of the high duty on foreign iron, it is stated: "The quantity of iron exported from Stockholm in the year 1822 and also in 1824 was 36,000 tons. Sweden in general exports perhaps 100, or 102,000 tons."

All of these deposits of coal are of the lignite species ; the mineral is of a velvet black colour, and approaching to jet or pitch coal. The Kaneegoorum coal burns freely ; and with much flame and smoke ; the Hissaruk is rich-looking, crumbles into angular fragments, and particles of it, as well as that of Dobundee, which I have tried in the flame of a candle, burned well, considering that they were obtained from the surface. What I have as yet discovered at Dobundee is in very thin seams, pulverulent, and resembling coal-dust more than anything else. The Syghan coal ignites with great difficulty, and the flame, which is very slight, has a greenish tinge. Underneath the surface, this character may be expected to alter considerably for the better.

Although this coal is of a subsequent geological date to the mineral we are accustomed to use in England, which belongs to what is technically termed the "independent coal formation," it by no means follows, that profitable beds of it may not be discovered, and in time create a great change in the comfort and commercial prosperity of many parts of this kingdom, where wood is extremely scarce. Coal of this description is extensively used in many parts of Europe, and is frequently of excellent quality.* It is mined in the island of Veglia for the use of the Trieste steamers. Twenty-eight beds of it are wrought about Toulon and Marseilles. At Colognet here is a bed of it 30 feet thick ; the mines of Styria, and of Buda in Hungary, are famous for their immense supplies of this fuel ; great beds of it are worked in Switzerland, in the valleys of the Po, the Danube, and other quarters of the continent.

It will readily be acknowledged, therefore, that although the coal deposits of this country belong to a more recent geological period than that of the independent coal formation, it would be an unphilosophical conclusion to suppose on that account, that they may not exercise the happiest influence on the welfare of its inhabitants. To the Huzareh, the possession of this substance, if found in sufficient quantities, would prove most invaluable. It would enable him to work with every advantage his abundant mines of iron, copper, and lead ; and in a country with so rigorous a climate. and so destitute of fuel, it would be to him the most useful production. Should profitable beds of the mineral be discovered in the direction of Dobundee, there is a level road from it to Cabool, by the plain of Sagur ; and how far the formation may be traced along the Ghilzye tract is yet unknown.

Lastly, the coal of the Wuzeeree territory may turn out of importance, as well for the working of the extensive iron mines in that quarter, as for steam navigation on the Indus.

Gold, &c.

Amidst the numerous samples of ores which have come under my observation, the gold which is brought down by the streams from the mountains above Lughman and Kooner, is all that I have as yet seen, which I can pronounce upon as pertaining to the precious metals. It is stated to be found likewise in streams from the Kohi Baba range, in the country of the Huzarehs, and also in some of the streams of Kohistan ; but I have not yet received specimens from these districts ; the report however, is not at all improbable, and I believe myself it will be found all along the line of greatest elevation of the Hindoo Kosh and Indian Caucasus.

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* At a single establishment in Wales, there are 13 large blast iron furnaces at work, and it is estimated that their consumption of fuel is 400,000 tons of coal per annum. Works like these convey an idea of the stupendous industry of England.

Whether this gold occurs originally in a disseminated state throughout the strata from which it is detached, or whether there exist distinct repositories of the metal, and in connection with some of the beds of iron, which from the iron sand that accompanies the gold must be intersected by the streams, is a subject for future inquiry. To the best of my recollection, all the gold brought to London by the Brazilian Mining Company is found accompanying iron, whether in the alluvial deposits from which it is washed, or the mines where it is worked.

Specimens without number have been brought to me from various parts of the country, supposed by the golden hue of the one, and the silvery whiteness of the other, to belong to the precious metals. In none, however, have I been able to recognise any thing beyond the sulphuret of iron under different forms, and a compound perhaps of sulphur, arsenic, and iron. There are some specimens, however, respecting which I am not quite certain, and these I shall transmit for chemical examination. Having nothing but my blowpipe apparatus to depend upon, when any doubt exists as to the constitutions of a mineral, it is desirable that they should be subjected to the test of analysis. On one occasion I tried a specimen from a deposit in Dobundee, (the ore externally has the appearance of an ore of silver,) and I saw a small head which appeared not unlike impure silver, but since then I have repeated the trial frequently without coming to any satisfactory result. The fragment of a mineral, however, which is submitted to the action of the blowpipe is so very minute, being no larger than a grain of pepper, that I should not wish these attempts to be considered final. Argentiferous arsenical iron is worked in Germany as an ore of silver, and should that metal be discovered in this country, it will probably be found in combination with some of these ores, or what is still more likely, with some of the numerous veins of lead which are to be met with.

Amongst all the specimens of iron pyrites, which have been brought to me, I have seen nothing that could be termed curiferous. Latterly, I have heard several reports of the existence of silver, but the Afghans are so addicted to the marvellous, and so easily imposed upon by designing alchymists, that I would never attach the smallest credit to them, unless a specimen of the mineral be produced. By all accounts, the Huzareh country must be the richest in minerals of any other in Afghanistan, from the number of old mines said to be there, and the remains of ancient cities in their neighbourhood, which would seem to indicate, that its mineral wealth in former times had been the cause of attraction. Whether silver may exist amongst these mines, is a point to be ascertained.

A story was told me lately by Aga Hoossain, a merchant of Herat, that at Mough in the Eimough or Eimouk country, there is an inscription in the Hebrew character, on a large black slab, to the effect, that in the days of king Jumshed, (1274 years ago,) the following mines were discovered :—

3 of Silver,
1 of Lapis Lazuli,
3 of Iron,
1 of Copper,
2 of Lead,
1 of Sulphur.

I doubt the genuineness of the whole story, but there is I believe no doubt of the fact, that old mines do exist there, and what they are, is yet to be ascertained. My informant says that he saw a number of old grinding stones in a stream close by the mines, which are believed to have been used by the ancients for crushing ore. It is reported also among some of the Huzarehs, that a number of golden vessels were discovered once in some of the old mines of their country, and there is a tradition of gold mines having been worked, but that the vein or veins are now lost. To tales like these I attach no importance, further than as a stimulus to, and a necessity for, investigation. I believe, moreover, from the specimens of iron, lead, copper, sulphur, and coal, which have been brought to me from thence, that the whole of that country is a rich mineral tract, and if the precious metals do exist there, as they are generally found in small quantity, it must be remembered, that their discovery is not likely to take place all at once, but to be the work probably of time and patient inquiry. A speck of gold in a piece of quartz may point to a deposit of that metal; or an accidental circumstance, (such as a Populzye chief related to me the other day,) may lead to the discovery of silver: namely, that many years ago small particles of it had been observed in a stone on which a fire had been lighted.

A specimen of cinnabar, (sulphuret of mercury,) was brought to me once by a villager, who said he had found it in the neighbourhood of Sultanpore near Jelallabad; but as I did not find any traces of it in the rocks in that vicinity, the probability is, it may have been dropped there by accident. Cinnabar is a rich ore of quicksilver, it is a production of Thibet, and if it be ever found in this country, it will more likely be discovered in the direction of the Kohi Baba range than elsewhere. I lately heard also of a very heavy red coloured stone, which is used by the natives in that quarter as a pigment, and sent for a specimen of it, but the individual I commissioned has not yet arrived. A person who was returning from that country the other day with a collection of specimens, was unfortunately robbed of every thing he had. Were the Huzarehs any other people, I should conclude from the description of the mineral that was given, and their manner of using it, that it was cinnabar, but they are such a perfectly rude and ignorant race, that I fear it will be found to be simply the red oxide of iron. Should gold dust be ever collected on the great scale, or veins of the precious metals be discovered and worked in this country, a mine of quicksilver would be of great importance for the necessary amalgamation works; but this is at present a very vague speculation.

Copper.

I have mentioned the existence of copper in the Ghilzye and Huzareh territories, specimens also from Bagour have come under my notice.*

Lead.

Lead seems to abound in the Huzareh districts, in Ghorabund of Kohistan, and in Wurduk. The lead of the former two is of an excellent quality, the latter is inferior, and of a harsher character. The ore is the sulphuret of lead, and that which I have seen from the Huzareh country, occurs in the form of the carbonate likewise. Lead is also stated to be found in Bungesh, and a specimen of it from the Sufued Koh has been brought me lately.

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* The price of lead in Cabool in time of Dost Mahomed Khan was Rs. 1½ per Cabool seer, at present its sells for Rs. 3.

Antimony.

With regard to antimony, I find that what is sold in the bazar of Cabool as such is a sulphuret of lead. Occasionally, perhaps, a proportion of antimony may be combined with it, forming what is called the sulphuret of lead and antimony.

I could not convince a vender of antimony, upon one occasion, that what he brought me as pure specimen of that mineral, was not so in reality, until I submitted a fragment of it to the action of the blowpipe, and on disengaging the sulphur, showed him what excellent lead was produced. Having at the time a small piece of massive sulphuret of antimony in my possession, and which, to the eye of the antimony dealer presented very much the same external character as his own, I then placed a fragment of it in the flame of the blowpipe, and the antimony immediately melted, and was absorbed by the charcoal, giving off the white fumes peculiar to it, and no trace of lead was observed.

That antimony, however, exists in this country, is beyond a doubt. It is mentioned in the report of the late Dr. LORD on Ghorabund as occurring in that district, and I myself saw in the possession of an officer, a mass of pure antimony, which was found in the neighbourhood of Quetta.

Plumbago.

Graphite, or plumbago, is a production of this country. I have a specimen of it, reported to be from the vicinity of Kohi Daumun.

Sulphur, &c.

Specimens of sulphur have been brought me from the Huzareh country, and it is reported as occurring there in vast quantity. Saltpetre is produced abundantly from the soil. Rock salt I observed in the hills near Jelallabad by the Soorkhao river, but in too small quantity to be worth working; a sample of it from Altamoor also has been sent me, but I do not suppose it is in sufficient abundance there, to be of any consequence. Marble occurs at Mydan, and probably in many other places, but this and gypsum, and minerals of that sort, it will be time enough to direct attention to, when the country has made sufficient progress in the arts, to render them objects of value for economical purposes.

The most important minerals of Northern Afghanistan, are the following:—

Iron. This mineral is found in many parts of the country, particularly in the Huzareh, the Ghilzye, the Bajour, and the Wuzeeree territories.*

Lead is found in the Huzareh districts, in Wurduk, and in Kohistan.

Copper is found in the Huzareh, the Ghilzye, and Bajour territories.

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* In Captain HERBERT's report on the minerals of the Himalaya, published in the 18th volume of the Asiatic Researches, he makes the following observation in his account of the lead mines:—"A singular fact is, that the ore and reduced metal sell by weight for the same price at Kalsi, the nearest town. I could not learn the reason of this, but suppose that the produce of sulphur pays the expence of reducing the ore." When I read this, I suspected there might be a portion of the ore, known to be argentiferous; but it is evident that the purest is selected at Kalsi as at Cabool, and sold under the general term of *soorma*, or antimony.

Gold is found in several streams north of the Cabool river.

Coal is found in the Huzareh, the Ghilzye, and the Wuzeeree districts.

Sulphur is found in the Huzareh districts.

Here then are materials for commencing the work of civilization in this rude and barbarous region, giving a stimulus to its commerce, increasing its revenues, and affording employment to its indigent, but hardy and industriously inclined population.

A remark has been made, that "the mountains in this world no doubt abound in mines, but that the people must be enlightened before they can be worked." And in what way might I ask, is this period of enlightenment to be brought about? Are these great mineral repositories intended to lie idle in the meantime, to form merely the subject of a scientific theme, and furnish a few specimens for the cabinets of the curious—or, are they designed by an unerring Hand for the great moral end, not only of administering to the immediate wants of the people, but in their very extraction to be the means of exercising their energies, mental as well as physical, improving their habits, and thereby contributing effectually to raise them from the brutal condition into which they have fallen?*

Let this nation be taught the practical manual arts, so as to enable them to turn the productions of their country to account,—let the hand of the Afghan, under the eye of the European, unlock that wealth which is intended for his use,—then may we expect to see the rays of civilization break in upon the moral and intellectual gloom which pervades this darkened land.

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* In a casual conversation I had lately with the intelligent Barukzye chief I have alluded to (Oosmen Khan) he observed :—" If the feeling of the English people towards this country be as you describe it, and its various resources receive that attention which it is out of the power of my own countrymen, from their poverty and ignorance to bestow on them, then not only will Cabool become happy and contented, but surrounding nations, on seeing the prosperity of Cabool, will desire of themselves to come under the protection of the English."